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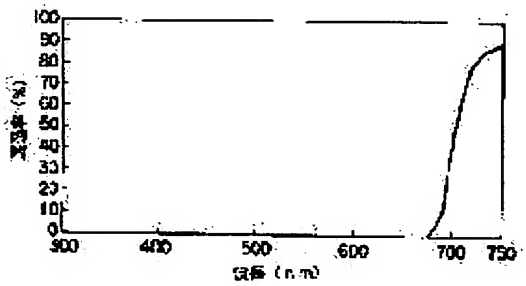
(54) WATER-SOLUBLE FLUORESCENT INK AND METHOD FOR DISTINGUISHING WATER-SOLUBLE FLUORESCENT INK

(57)Abstract:
PROBLEM TO BE SOLVED: To enable the recognition of an invisible or hardly visible print even when a fluorescent whitening agent is used as the fluorescent material to print on a printing medium contg. a flurescent whitening agent.
SOLUTION: An absorbent material in an amount of 0.15-1.0wt.% having an absorption near at a wavelength of 700-850nm is added to a water-soluble fluorescent ink contg., as the main ingredients, water, a water-soluble resin, a hydrophilic org. solvent, and a fluorescent whitening agent excitable by ultraviolet rays from a black lamp. The ink is then used to print on a printing medium. The medium thus printed is exposed to ultraviolet rays, and the reflected light having wavelengths of 700nm or higher and light emitted by the ink are detected to check the existence of the ink, enabling the reading of print contents.



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[Claim(s)]

[Claim 1] Water-soluble fluorescence ink characterized by adding a charge of an absorber to which wavelength has absorption near 700nm - 850nm in water-soluble fluorescence ink which contains a fluorescence material excited by water, water soluble resin, a hydrophilic organic solvent, and ultraviolet rays as a principal component.

[Claim 2] a charge of an absorber -- less than [more than 0.25wt%1.0wt%] -- water-soluble fluorescence ink according to claim 1 characterized by adding.

[Claim 3] In water-soluble fluorescence ink which contains a fluorescence material excited by water, water soluble resin, a hydrophilic organic solvent, and ultraviolet rays as a principal component Wavelength irradiates ultraviolet rays to print media printed using water-soluble fluorescence ink which added a charge of an absorber which has absorption near 700nm - 850nm. A distinction method of water-soluble fluorescence ink characterized by for wavelength detecting the reflected light 700nm or more and luminescence light from said water-soluble fluorescence ink, and distinguishing existence of fluorescence ink.

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to the distinction method which distinguishes water-soluble fluorescence ink from the printed matter printed using the water-soluble fluorescence ink which is called as it is invisible, and which cannot appear easily or it is not visible, and this water-soluble fluorescence ink.

[0002]

[Description of the Prior Art] For example, since print address information by the bar code in this mail in order to carry out the automatic partition of the mail, or it laps with an address if a bar code can be seen in printing a bar code for security, or the semantics of security is lost, it is inconvenient. For this reason, or it is not visible, a bar code is printed using the fluorescence ink which cannot appear easily. As such fluorescence ink, when the former (for example, it can obtain with the black lamp which has peak

wavelength in a 365nm ultraviolet region.), for example, ultraviolet radiation, is irradiated, fluorescent dye, such as a fluorescent brightener which has peak wavelength near 440nm - 450nm, is melted to the solvent which consists of water and a hydrophilic organic solvent, and what added the defoaming agent, the antifungal agent, etc. if needed further is known. Moreover, the fluorescence ink using the special fluorescence material which irradiates ultraviolet radiation and emits light near 600nm is also known.

[0003]

[Problem(s) to be Solved by the Invention] Although the fluorescent brightener etc. is being used for the former fluorescence ink as fluorescent dye, generally, a fluorescent brightener is excited by irradiating ultraviolet radiation, and emits blue luminescence. Moreover, the fluorescence ink which used the fluorescent brightener can perform printing which is not in sight to concentration remarkable as visibility. In addition, if it becomes high concentration, it will cut in yellowness a little. However, when sufficient S/N ratio was not obtained when the distinction with the portion of ink and the portion of paper had to be distinguished by the size of a radiant power output and the printing condition was bad, and the printed location was the blue complementary color, when the fluorescent brightener is added by white paper usual [almost all] and it prints in this fluorescence ink for this reason, or the black alphabetic character was written, there was a problem to which distinction becomes difficult. For this reason, there was a problem that it could not print in the white form with which the fluorescent brightener is added using this fluorescence ink.

[0004] Moreover, since the special fluorescence material which the latter fluorescence ink irradiates ultraviolet radiation and emits light near 600nm is used, For example, since the Eu-TTA (europium-thenoyltrifluoroacetone chelate) fluorescent substance in which ultraviolet radiation is irradiated in JP,54-22335,B and luminescence near 600nm - 620nm is shown is used, Read becomes possible even if it prints on a white form by using the filter which wavelength differs [filter] from a fluorescent brightener greatly, therefore makes the light more than near 520nm penetrate. However, in some which use this special fluorescence material, a fluorescence material is expensive and, for this reason, there was a problem that fluorescence ink could not but become expensive.

[0005] Furthermore, a characteristic spectrum arises, covering it near 800nm from near 700nm under the effect of the mercurial line. Under this effect, even place [which did not have a fluorescent substance], the reflected light of a black lamp was detected by the sensor, and there was a problem that a S/N ratio fell. Moreover, although there was also a material in which luminescence of a visible region is shown by ultraviolet

radiation exposure as an inorganic material, luminescence reinforcement was small, and responsibility was also bad, and the inorganic pigment had further the trouble which needs the dispersed system stabilized in order not to dissolve in a solvent.

[0006] Then, invention according to claim 1 can perform printing which cannot be in sight easily or it is not visible using a fluorescent brightener cheap as a fluorescence material etc., and it offers the water-soluble fluorescence ink which can recognize the contents of printing, without being greatly influenced of the fluorescent brightener on print media, even if it prints on the print media by which the fluorescent brightener is moreover added.

[0007] Moreover, invention according to claim 2 can perform printing which does not look certain using a fluorescent brightener cheap as a fluorescence material etc., and it offers the water-soluble fluorescence ink in which positive recognition of the contents of printing is possible, without being influenced [most] of the fluorescent brightener on print media, even if it prints on the print media by which the fluorescent brightener is moreover added.

[0008] Moreover, invention according to claim 3 offers the distinction method of the water-soluble fluorescence ink which can perform recognition of the contents of printing certainly, without being influenced of the fluorescent brightener on print media, when [which cannot be in sight easily or it is not visible on the print media by which the fluorescent brightener is added using the water-soluble fluorescence ink which added the charge of an absorber to which wavelength has absorption near 700nm - 850nm, while adding a fluorescent brightener etc. as a fluorescence material] it prints.

[0009]

[Means for Solving the Problem] Water-soluble fluorescence ink which added a charge of an absorber to which wavelength has absorption near 700nm - 850nm in water-soluble fluorescence ink which contains a fluorescence material excited by water, water soluble resin, a hydrophilic organic solvent, and ultraviolet rays as a principal component has invention according to claim 1.

[0010] invention according to claim 2 -- water-soluble fluorescence ink according to claim 1 -- setting -- a charge of an absorber -- less than [more than 0.25wt%1.0wt%] -- it is in having added.

[0011] Invention according to claim 3 in water-soluble fluorescence ink which contains a fluorescence material excited by water, water soluble resin, a hydrophilic organic solvent, and ultraviolet rays as a principal component Ultraviolet rays are irradiated to print media printed using water-soluble fluorescence ink which added a charge of an absorber to which wavelength has absorption near 700nm - 850nm, and wavelength is to detect the reflected light 700nm or more and luminescence light from water-soluble

fluorescence ink, and distinguish existence of fluorescence ink.

[0012]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing. As water-soluble fluorescence ink, the water-soluble fluorescence ink in which a principal component consists of a fluorescence material excited by water, water soluble resin, a hydrophilic organic solvent, and ultraviolet rays, for example, the water-soluble fluorescence ink of the ultraviolet-rays excitation mold which dissolved the water-soluble fluorescent brightener which are water soluble resin and a fluorescence material in water and a hydrophilic organic solvent, is used, and the water-soluble phthalocyanine system color (NIPPON SHOKUBAI [Co., Ltd.] Co., Ltd. make) which is the infrared absorption agent which has absorption in this water-soluble fluorescence ink 700nm-850 is mixed. As an addition, it adds so that the concentration of said water-soluble phthalocyanine system color may become less than [more than 0.25wt%1.0wt%].

[0013] the styrene acrylic resin (for example, the styrene maleic resin neutralized with the Johnson Polymer company make or ammonia is usable.) neutralized by ammonia, monoethanolamine, etc. as said water soluble resin -- 1wt% - 15wt% -- it adds. desirable -- less than [more than 1wt%12.5wt%] -- it adds. Although it is so desirable that there is much water soluble resin as fluorescence ink, when using it as ink of an ink jet printer, it is made less than [15wt%] from flight stability.

[0014] as a hydrophilic organic solvent -- polyhydric alcohol, such as ethylene glycol, propylene glycol, a diethylene glycol, a polyethylene glycol, dipropylene glycol, and a glycerol, -- one kind -- or it is mixed and used. this polyhydric alcohol -- 10wt(s)% - 50wt% -- it adds. Moreover, assistants, such as a defoaming agent, a surfactant, an antifungal agent, and antiseptics, are added if needed.

[0015] for example, as a water-soluble fluorescent brightener which is the fluorescence material excited by ultraviolet rays Mikerphor BS conc 200% by Mitsui Toatsu Chemicals, Inc. (BS is called hereafter.) It is used and styrene acrylic resin (the Johnson Polymer company make) is used as water soluble resin. As a hydrophilic organic solvent As a water-soluble phthalocyanine system color which is the infrared absorption agent which uses propylene glycol and has absorption in 700nm-850 Various kinds of water-soluble fluorescence ink in which the amounts of mixing differ using IEKU scalar 702W (NIPPON SHOKUBAI [Co., Ltd.] Co., Ltd. make) is manufactured. Using each of this water-soluble fluorescence ink, it printed on the private postcard of the white which is print media with the ink jet printer of a mold on demand, and actinometry was performed on it using the actinometry equipment in which this is shown at drawing 1 . Viscosity is adjusted to about 10cps and surface tension is adjusting every water-soluble

fluorescence ink to about 40 dyn/cm.

[0016] Said actinometry equipment irradiates ultraviolet radiation at the private postcard 2 using the black lamp 1 which has peak wavelength in a 365nm ultraviolet region, and the 2nd CCD sensor 8 detects it through the 2nd condenser lens 6 and 2nd filter 7 while it detects the reflected light from the private postcard 2 by the 1st CCD sensor 5 through the 1st condenser lens 3 and 1st filter 4.

[0017] As said 1st filter 4, as shown in drawing 2 , R-70 filter with the light transmission property of making the wavelength of 700nm or more penetrating is used, and L-42 filter with the light transmission property of making the wavelength of 420nm or more penetrating as said 2nd filter 7 as shown in drawing 3 is used. Moreover, said IEKU scalar 702W have the light transmission property shown in drawing 4 .

[0018] Water-soluble fluorescence ink 1 (example 1 of a comparison)

The amount of water soluble resin -- 5wt% hydrophilicity organic solvent -- 34wt% water -- 57wt% surfactant -- 1wt% defoaming agent -- 0.2wt%BS -- 2wt% others -- 0.8wt% water solubility fluorescence ink 2 (example 2 of a comparison)

The amount of water soluble resin -- 5wt% hydrophilicity organic solvent -- 34wt% water -- 57wt% surfactant -- 1wt% defoaming agent -- 0.2wt%BS -- 2wt% infrared absorbent -- 0.1wt% others -- 0.7wt% water solubility fluorescence ink 3 (example 3 of a comparison)

The amount of water soluble resin -- 5wt% hydrophilicity organic solvent -- 34wt% water -- 57wt% surfactant -- 1wt% defoaming agent -- 0.2wt%BS -- 2wt% infrared absorbent -- 0.2wt% others -- 0.7wt% water solubility fluorescence ink 4 (example 1)

The amount of water soluble resin -- 5wt% hydrophilicity organic solvent -- 34wt% water -- 57wt% surfactant -- 1wt% defoaming agent -- 0.2wt%BS -- 2wt% infrared absorbent -- 0.25wt% others -- 0.65wt% water solubility fluorescence ink 5 (example 2)

The amount of water soluble resin -- 5wt% hydrophilicity organic solvent -- 34wt% water -- 57wt% surfactant -- 1wt% defoaming agent -- 0.2wt%BS -- 2wt% infrared absorbent -- 0.5wt% others -- 0.3wt% water solubility fluorescence ink 6 (example 3)

The amount of water soluble resin -- 5wt% hydrophilicity organic solvent -- 33.5wt% water -- 57wt% surfactant -- 1wt% defoaming agent -- 0.2wt%BS -- 2wt% infrared absorbent -- 1.0wt% others -- 0.3wt% water solubility fluorescence ink 7 (example 4 of a comparison)

The amount of water soluble resin -- 5wt% hydrophilicity organic solvent -- 33.3wt% water -- 57wt% surfactant -- 1wt% defoaming agent -- 0.2wt%BS -- 2wt% infrared absorbent -- 1.25wt% others -- It printed on the private postcard about the water-soluble fluorescence ink 1-7 beyond 0.25wt%, and when investigated about the visibility of the result of having measured this with the actinometry equipment of drawing 1 , and the

printed result, the result shown in a table 1 was obtained.

[0019]

[A table 1]

	赤外線吸収剤の含有率（%）	CCDセンサ5出力	CCDセンサ8出力	視認性
比較例1	0	0. 5 (×)	2. 1	○
比較例2	0. 1	0. 3 (×)	1. 81	○
比較例3	0. 2	0. 2 (×)	1. 73	○
比較例4	1. 25	0. 05 (○)	1. 55	△
実施例1	0. 25	0. 09 (○)	1. 62	○
実施例2	0. 5	0. 07 (○)	1. 6	○
実施例3	1	0. 06 (○)	1. 58	○

[0020] In addition, in a table 1, the output of the 1st CCD sensor 5 and the 2nd CCD sensor 8 is V (voltage). Moreover, as for O of the 1st CCD sensor output, read shows fitness, and x shows the defect. Moreover, fitness is shown as fluorescence ink which cannot appear easily or O of visibility is not visible, x shows a defect and ** shows the defect a little.

[0021] If an infrared absorption agent is added exceeding 1wt% as shown also in a table 1, as fluorescence ink which does not appear even if enough as fluorescence ink which a color (IEKU scalar 702W present deep green or brown.) when an absorbent melts becomes strong, and cannot appear easily, it will become inadequate. Moreover, less than [0.2wt%], the output of the 1st CCD sensor 5 exceeded [addition of an infrared absorption agent] 0.1V, and the result that the reflected light near 700nm - 800nm of a black lamp 1 could not fully be cut came out. Therefore, when addition of an infrared absorption agent is less than [0.2wt%], for example, when conveying neither the case where a postcard is conveyed at a comparatively late speed of 2 or less m/sec, nor a postcard, read of the contents of printing is made. However, when a postcard is conveyed at a comparatively early speed exceeding 2 m/sec, there is a possibility that read may become incorrectness. On the other hand, if addition of an infrared absorption agent is carried out more than 0.25wt%, the output of the 1st CCD sensor 5 becomes less than [0.1V], it is not influenced of the reflected light near 700nm - 800nm of a black lamp 1, but read is made, and even if it conveys a postcard at an early speed exceeding 2 m/sec, read of the contents of printing will be made certainly.

[0022] In order to be fluorescence ink not appearing and to have ensured read of the contents of printing in high-speed conveyance moreover from the above thing, it turned out that it is desirable to add an infrared absorption agent in 0.25wt(s)% - 1wt%.

[0023] The output of the 2nd CCD sensor 8 is for recognizing luminescence of fluorescence ink, or luminescence by the fluorescent brightener in the paper, and detects an optical output with a wavelength of 420nm or more. Therefore, the 2nd CCD sensor 8 will detect luminescence of the fluorescent material in fluorescence ink, and the reflected light 700nm or more of a black lamp 1 to coincidence. For example, the incident light property to the 2nd CCD sensor 8 at the time of using the water-soluble fluorescence ink 2 which is the example 2 of a comparison turns into the property of the luminescence light from BS which is a water-soluble fluorescent brightener as shown in drawing 5 , and a property which compounded the property of the reflected light 700nm or more by the black lamp 1, and the reflected light 700nm or more by the black lamp 1 will be detected in large quantities.

[0024] On the other hand, the incident light property to the 2nd CCD sensor 8 at the time of, for example, using the water-soluble fluorescence ink 5 which is an example 2 turns into the property of not being influenced of the reflected light 700nm or more of a black lamp 1, as shown in drawing 6 . This is for the infrared absorption agent added in fluorescence ink to absorb the reflected light 700nm or more of a black lamp 1. Therefore, when the water-soluble fluorescence ink 5 which is an example 2 is used also from the output of the 2nd CCD sensor 8, it turns out that the contents of printing can be read certainly, without being influenced of the reflected light 700nm or more of a black lamp 1. BS which is a water-soluble fluorescent brightener in the example of a comparison and example which were mentioned above -- 2wt(s)% -- although the case where it added was described, since a property as shown in drawing 7 is shown as concentration-luminescence output characteristics of BS, about five 2.5wt(s) are good in fact.

[0025] By adding the charge of an absorber to which wavelength has absorption in the water-soluble fluorescence ink which contains the fluorescence material excited by water, water soluble resin, a hydrophilic organic solvent, and ultraviolet rays as a principal component from the above result near 700nm - 850nm Or it is not visible, printing which cannot be in sight easily can be performed, and recognition of the contents of printing can be performed, without being greatly influenced of the fluorescent brightener on a form, even if it prints on the usual white form with which the fluorescent brightener is moreover added. It is making addition of the charge of an absorber into less than [more than 0.25wt%1.0wt%] more desirably. Printing which does not look certain can be performed, and recognition of the contents of printing can be performed certainly, without being influenced [most] of the fluorescent brightener on a form, even if it prints on the usual white form with which the fluorescent brightener is moreover added. For example, even if it prints on a postcard and conveys

this postcard at high speed, the contents of printing can be read certainly.

[0026] Next, how to distinguish the existence of fluorescence ink using the reader in which bar code 22a which is not visible in the water-soluble fluorescence ink which added the charge of an absorber to which wavelength has absorption near 700nm - 850nm in the water-soluble fluorescence ink containing the fluorescence material excited as a principal component by water, water soluble resin, the hydrophilic organic solvent, and ultraviolet rays is printed on the private postcard 22 which is print media as shown in drawing 11 , and this is shown at drawing 8 at it is described. As shown in drawing 8 , the private postcard 22 is conveyed, ultraviolet radiation is irradiated from a black lamp 21 in the printing side of bar code 22a, one side detects the reflected light from the private postcard 22 by the 1st CCD sensor 25 through the 1st condenser lens 23 and 1st filter 24, and the 2nd CCD sensor 28 detects another side through the 2nd condenser lens 26 and 2nd filter 27.

[0027] As said 1st filter 24, as shown in drawing 3 , L-42 filter with the light transmission property of making the wavelength of 420nm or more penetrating is used, and R-70 filter with the light transmission property of making the wavelength of 700nm or more penetrating as said 2nd filter 27 as shown in drawing 2 is used.

[0028] First, the private postcard 22 conveys, the ultraviolet radiation from a black lamp 21 is irradiated, and the reflected light is detected by the 1st CCD sensor 25 through the 1st condenser lens 23 and 1st filter 24. Since the 1st filter 24 penetrates only the wavelength of 420nm or more at this time, the wavelength of 365nm which is the principal component of a black lamp 1 is cut. Moreover, although a spectrum characteristic near 800nm produces a black lamp 1 from near 700nm under the effect of the mercurial line, this reflected light is absorbed by the infrared absorption agent in fluorescence ink.

[0029] Therefore, when the fluorescence ink of bar code 22a is read by the 1st CCD sensor 25, Since it has a peak near 440nm with the fluorescent brightener contained in fluorescence ink and the spectrum of the characteristic mercurial line near 700nm - 800nm arises in a black lamp 1 The wavelength property of the fluorescence ink which the 1st CCD sensor 25 detects turns into a property shown in drawing 9 in the graph a of a continuous line, and the output of these sum totals is sent out from the 1st CCD sensor 25. The output at this time is set to 1.2V.

[0030] Moreover, when the white portion on postcards 22 other than bar code 22a is read by the 1st CCD sensor 25, the wavelength property of the reflected light from the white portion on the postcard which the 1st CCD sensor 25 detects turns into a property shown in drawing 9 in the graph b of a dotted line with the spectrum of the mercurial line of the reflected light from a fluorescent brightener, and a black lamp 1 contained in

the white portion, and the output of these sum totals is sent out from the 1st CCD sensor 25. The output at this time is set to 0.8V. In the phase of measurement by this 1st CCD sensor 25, even if it can perform distinction of the postcard which there is no level difference of an output not much, and contains the fluorescent brightener, or other postcards which do not contain the fluorescent brightener, it is difficult to ensure distinction of the white portion of a postcard, or the portion of fluorescence ink.

[0031] The private postcard 22 is conveyed further and the reflected light comes to be detected by the 2nd CCD sensor 28 through the 2nd condenser lens 26 and 2nd filter 27. Since the 2nd filter 27 penetrates only the wavelength of 700nm or more at this time, the reflected light from a fluorescent brightener which has a peak is cut into the wavelength of 365nm and near 440nm. [which are the principal component of a black lamp 1] Therefore, the wavelength which penetrates the 2nd filter 27 becomes main [the wavelength near / by the spectrum of the mercurial line of a black lamp 1 / 700nm - 800nm].

[0032] Since the infrared absorption agent which has absorption wavelength near 700nm - 850nm is added by this fluorescence ink when fluorescence ink is detected here, the wavelength near [by the spectrum of the mercurial line of a black lamp 1] 700nm - 800nm is absorbed, and the reflected light from a black lamp 1 is controlled. Therefore, the wavelength property of the fluorescence ink which the 2nd CCD sensor 28 detects turns into a property shown in drawing 10 in the graph c of a continuous line, and the output of the 2nd CCD sensor 28 is set to 0.05V.

[0033] On the other hand, since the reflected light from the white portion on a postcard 22 does not have absorption by the infrared absorption agent, the wavelength property of the reflected light from the white portion on the postcard which the 2nd CCD sensor 28 detects turns into a property shown in drawing 10 in the graph d of a dotted line, and greatly in response to the fact that the effect of the reflected light near [by the spectrum of the mercurial line of a black lamp 1] 700nm - 800nm, the output of the 2nd CCD sensor 28 is set to 0.3V.

[0034] Thus, since the output level of the 2nd CCD sensor 28 changes greatly with the reflected light from fluorescence ink, or reflected lights from the white portion of a postcard 22, it can distinguish from the output level of this 2nd CCD sensor 28 certainly in the read of fluorescence ink, or the read of the other portion.

[0035] If a flow chart shows the algorithm of the above distinction processing, it comes to be shown in drawing 12 . That is, if the detection output level of the 1st CCD sensor 25 confirms whether to be reference level (more than 0.4V [for example,]) and has not become in S1 probably more than reference level (0.4V), it distinguishes that it is the postcard 22 without bar code printing in fluorescence ink without a fluorescent

brightener component. Moreover, if the detection output level of the 1st CCD sensor 25 has become more than reference level (0.4V), it will be judged that it is the postcard 22 with a fluorescent brightener component.

[0036] Then, the output level of the 2nd CCD sensor 28 confirms whether to be reference level (more than 0.1V [for example,]) by S2, and with reference level [more than] (0.1V), it distinguishes that it is the portion of the white by which a postcard 22 is not printed. Moreover, with [the output level of the 2nd CCD sensor 28] reference level [under] (0.1V), it distinguishes that it is a printing portion in fluorescence ink. In this way, read of bar code 22a printed in fluorescence ink on the postcard 22 will be made certainly.

[0037] In addition, with the gestalt of operation mentioned above, as a fluorescent brightener excited by ultraviolet rays, although Mikerphor BS conc 200% by Mitsui Toatsu Chemicals, Inc. is used, it may not necessarily limit to this, and you may be other fluorescent brighteners. Moreover, with the gestalt of operation mentioned above, as an infrared absorption agent, not to necessarily limit to this, although water-soluble phthalocyanine system colors, such as IEKU scalar 702W, are used, and in short, what is necessary is just the charge of an absorber which has absorption wavelength near 700nm - 850nm. Moreover, as water soluble resin, although styrene acrylic resin is used, it may not necessarily limit to this, and PVP (polyvinyl pyrrolidone), PVA (poly vinyl alcohol), etc. may be used.

[0038] Moreover, since, as for the field which irradiates the printing section using the light source of the wavelength field absorbed by this charge of an absorber, for example, and is printed at this time, light is absorbed since the water-soluble fluorescence ink of the invention in this application has added the infrared absorption material, and it becomes black, the read of the contents of printing becomes possible also by such method.

[0039]

[Effect of the Invention] As mentioned above, since the charge of an absorber to which wavelength has absorption near 700nm - 850nm is added according to invention according to claim 1, printing which cannot be in sight easily or it is not visible using a fluorescent brightener cheap as a fluorescence material etc. can be performed, and the water-soluble fluorescence ink which can recognize the contents of printing can be offered, without being greatly influenced of the fluorescent brightener on print media, even if it prints on the print media by which the fluorescent brightener is moreover added.

[0040] Moreover, since the charge of an absorber to add is made into less than [more than 0.25wt%1.0wt%] according to invention according to claim 2, printing which does

not look certain using a fluorescent brightener cheap as a fluorescence material etc. can be performed, and the water-soluble fluorescence ink in which positive recognition of the contents of printing is possible can be offered, without being influenced [most] of the fluorescent brightener on print media, even if it prints on the print media by which the fluorescent brightener is moreover added.

[0041] Furthermore, according to invention according to claim 3 When [which cannot be in sight easily or it is not visible on the print media by which the fluorescent brightener is added using the water-soluble fluorescence ink which added the charge of an absorber to which wavelength has absorption near 700nm - 850nm, while adding a fluorescent brightener etc. as a fluorescence material] it prints The distinction method of the water-soluble fluorescence ink which can perform recognition of the contents of printing certainly can be offered without being influenced of the fluorescent brightener on print media.

[Brief Description of the Drawings]

[Drawing 1] The outline block diagram of the actinometry equipment which performs actinometry of the fluorescence ink in which the gestalt of operation of this invention is shown.

[Drawing 2] The graph which shows the light transmission property of the 1st filter in the actinometry equipment of drawing 1 .

[Drawing 3] The graph which shows the light transmission property of the 2nd filter in the actinometry equipment of drawing 1 .

[Drawing 4] The graph which shows the light transmission property of IEKU scalar 702W in the actinometry equipment of drawing 1 .

[Drawing 5] The graph which shows the incident light property in the example 2 of a comparison to the 2nd CCD sensor in the actinometry equipment of drawing 1 .

[Drawing 6] The graph which shows the incident light property in the example 2 to the 2nd CCD sensor in the actinometry equipment of drawing 1 .

[Drawing 7] The graph which shows the concentration-luminescence output characteristics of BS which is the water-soluble fluorescent brightener added in the water-soluble fluorescence ink used with the gestalt of this operation.

[Drawing 8] The outline block diagram of the reader which performs read of the contents of printing used with the gestalt of this operation.

[Drawing 9] The graph which shows the wavelength property of the fluorescence ink which the 1st CCD sensor in the reader of drawing 8 detects, and the wavelength property of the reflected light from the white portion on a postcard.

[Drawing 10] The graph which shows the wavelength property of the fluorescence ink

which the 2nd CCD sensor in the reader of drawing 8 detects, and the wavelength property of the reflected light from the white portion on a postcard.

[Drawing 11] Drawing showing the private postcard by which the reader of drawing 8 performs read.

[Drawing 12] The flow chart showing the read processing by the reader of drawing 8 .

[Description of Notations]

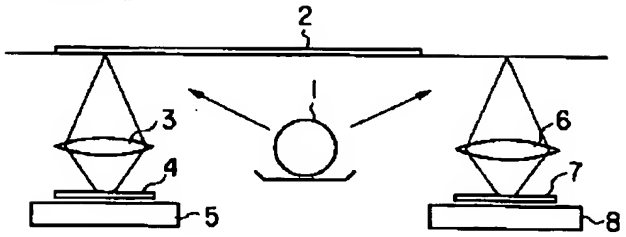
21 -- Black lamp

22 -- Private postcard (print media)

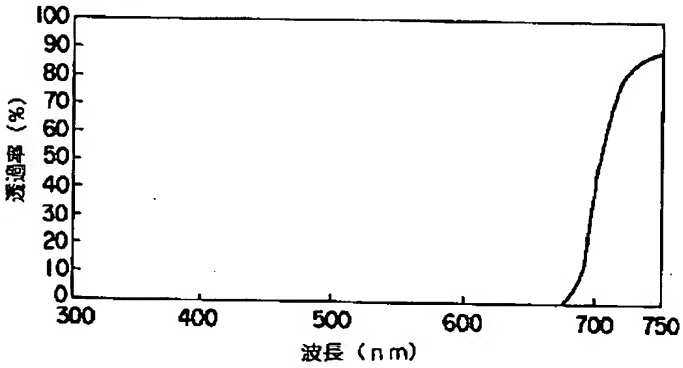
24 27 -- Filter

25 28 -- CCD sensor

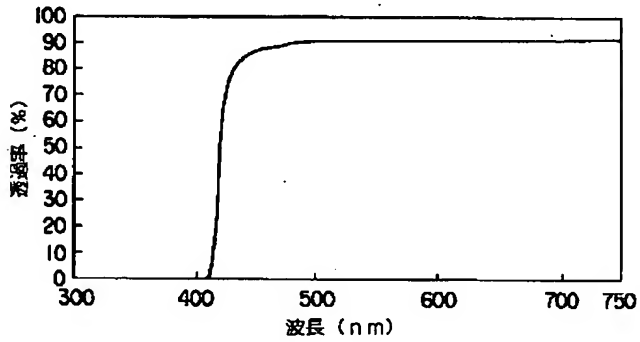
[Drawing 1]



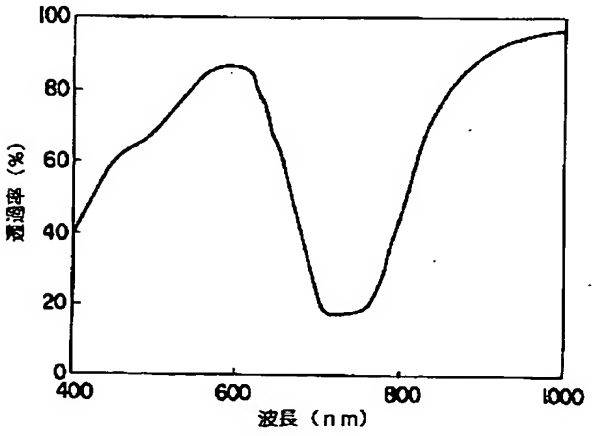
[Drawing 2]



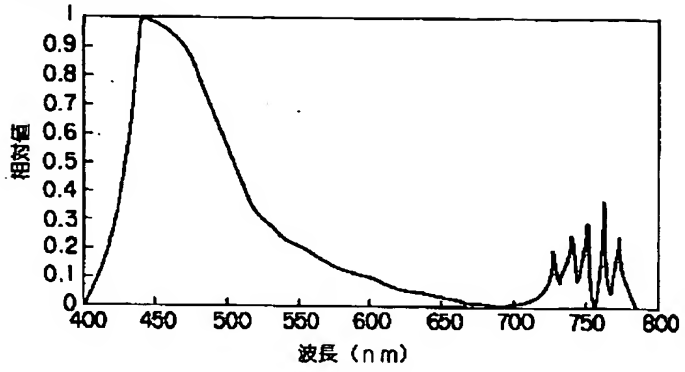
[Drawing 3]



[Drawing 4]



[Drawing 5]



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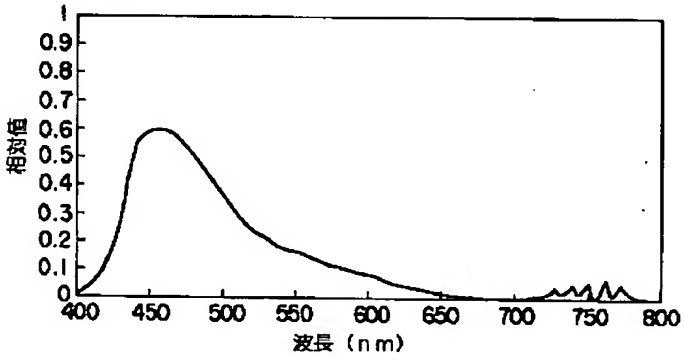
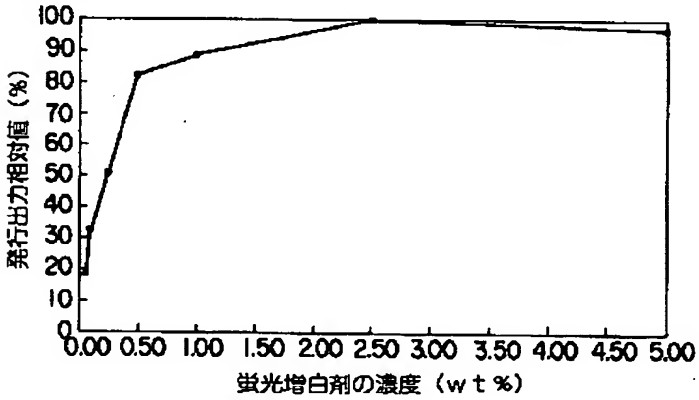
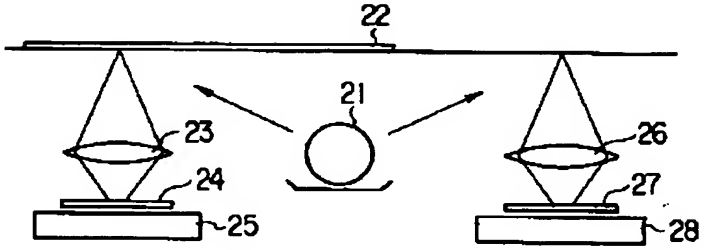


[Drawing 7]



[Drawing 8]



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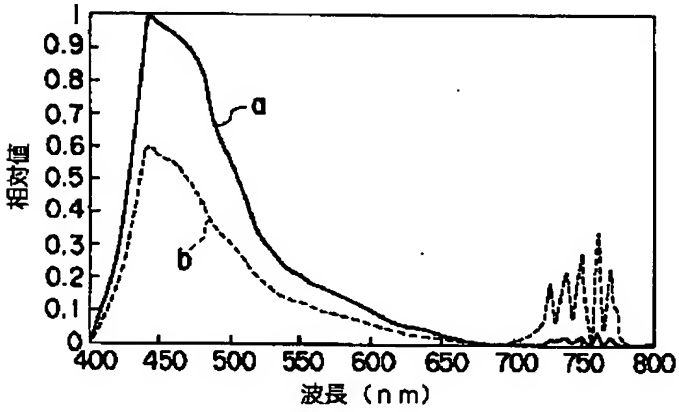
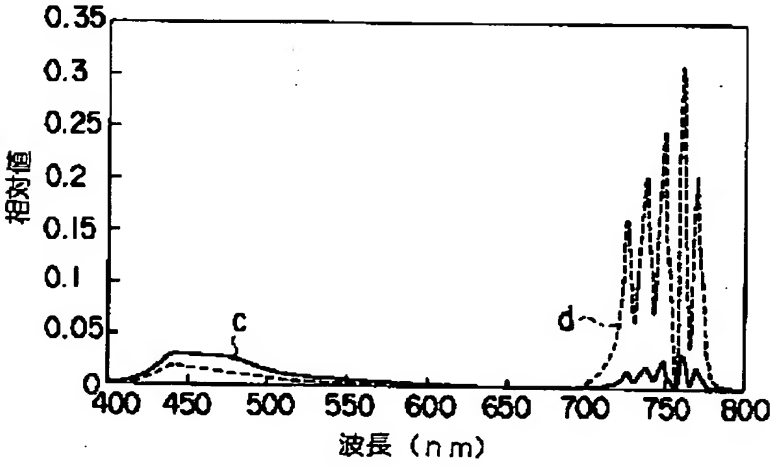
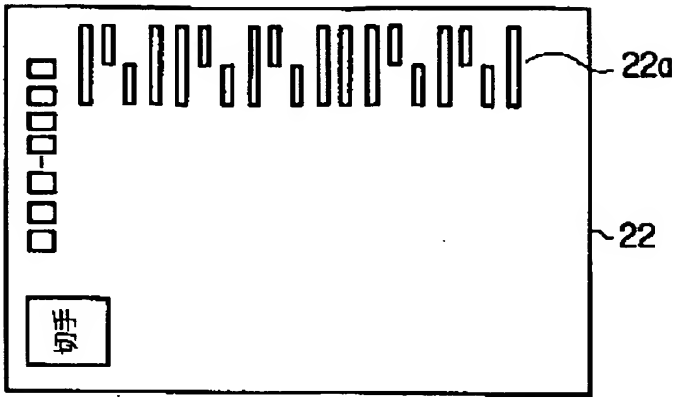


[Drawing 10]



[Drawing 11]



[Drawing 12]